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| Math CAMPPP 2011: Algebraic Thinking Breakout #1  What’s the Focus? Responding to Students in the Moment | | Breakout 9-12 |
| MO 35  AC 45  C/D 10  Total: 90 | Math Learning Goals   * **Important Math:** Explore connections between key components of algebraic thinking and proportional reasoning. * **Important Math**: Find key components of algebraic thinking and proportional reasoning in the curriculum expectations for specific courses. * R**esponding**: Identify examples of generalization and justification in student work. * **Important Math**: Explore concrete representations of functions. * **Important Math:** Explore the connection between patterning and algebraic thinking. | Materials   * BLM AT1.1 * Chart paper * Masking Tape * Crayons / markers * Linking cubes, Square tiles, algebra tiles * Student samples * powerpoint |
|  | **Small Group** 🡪 **Venn Diagram**  Participants will break into groups of 3 or 4 based on a secondary math course they have taught and would like to focus on in this activity. Using half of a sheet of chart paper, each group will create a Venn Diagram to illustrate any of the connections they see between the key mathematical ideas (Big Ideas) related to proportional reasoning and algebraic thinking. Note: explain to participants that they are not working on their individual courses at this point in time, but rather looking at these two topics in general. Draw their attention to information they have learned from the plenary sessions as well as the Big Ideas listed in the CAMPPP Programme. Allow about 15 minutes.  **Small Groups** 🡪 **Peer Review**  Ask participants to exchange Venn Diagrams with a neighbouring table group. Allow 5 minutes for each group to view the Venn Diagram they have received. Using a post-it note for feedback, write one statement: *“We really like…..”.* Using another post-it note for feedback, write one statement*: “We are wondering…..”.* Return Venn diagrams to their original groups and allow time for participants to read feedback and seek clarification if needed.  **Small Group** 🡪 **Venn Diagram**  Participants will now focus on the course that they chose when they were grouped. Ask them to map out the expectations related to proportional reasoning and algebraic thinking from the chosen course on their Venn Diagram. Spend about 15 min. Post Venn Diagrams on the wall (no formal debrief). | Offer choice of grouping in order to differentiate by interest.  Use the “course” graph created with sticker dots on the first day of CAMPPP to help determine appropriate groups. |
| Minds On… |
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|  | **Pairs 🡪 Discussion**  Regroup participants using Glyphs (pairs). Participants use student work samples from Cube Sticker problem (BLM AT1.1) to identify and discuss examples of algebraic thinking based on “Generalization Strategies and Justification Framework” (from Plenary). Pairs get together with another pair and share observations. Allow about 30 minutes.  Circulate and observe group discussions, common themes, challenges, insights relative to learning goal # 2  **Small Group 🡪 Model Building**  Build a concrete model of any function using the materials provided. (Algebra tiles, square tiles, cubalinks, sticky notes, diagrams etc.) About 15 minutes.  Possible scaffolding questions (responding in the moment)  “ What is the output when x is 25? How can you tell from your model?”  “Did you recall any functions in the Plenary?”  “Does your model represent a generalization or a pattern?”  Observe participants. Anticipate confusion between building a pattern and building a function. Listen for link between term number and “x” – the independent variable. | - Could group randomly – to encourage getting to know new people  - Use plenary slides for reference (Generalization, Justification)  Question is open, so participants can build any function any way. Differentiated by readiness.  - If time permits, could implement a “stay and stray” where participants circulate to observe other models. |
| Action! |
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|  | Whole Group 🡪Stay and Stray  One person from each group stays with the model while others stray to view other models. As groups visit tables they try to guess the function and the ‘stayer’ provides feedback in the moment. |  |
| Consolidate Debrief |
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|  | Home Activity or Further Classroom Consolidation  Individual 🡪 Reflection and Feedback  Participants reflect individually on their learning, and record their thinking in their passport or on their math map. |  |

**AT1.1: Cube Sticker Problem**

A company makes coloured rods by joining cubes in a row and using a sticker machine to put “smiley” stickers on the rods. The machine places exactly 1 sticker on each exposed face of each cube. Every exposed face of each cube has to have a sticker. This rod of length 2 (2 cubes) would need 10 stickers.

How many stickers would you need for:

A rod of 1 cube

A rod of 2 cubes

A rod of 3 cubes

A rod of 4 cubes

A rod of 10 cubes

How many stickers would you need for a rod of 20 cubes?

How many stickers would you need for a rod of 56 cubes?

What’s the rule?